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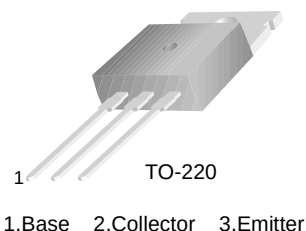
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## TIP120/121/122

### Medium Power Linear Switching Applications

- Complementary to TIP125/126/127

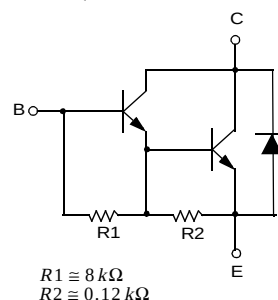


### NPN Epitaxial Darlington Transistor

#### Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter                                        | Value      | Units            |
|-----------|--------------------------------------------------|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage : TIP120                  | 60         | V                |
|           | : TIP121                                         | 80         | V                |
|           | : TIP122                                         | 100        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage : TIP120               | 60         | V                |
|           | : TIP121                                         | 80         | V                |
|           | : TIP122                                         | 100        | V                |
| $V_{EBO}$ | Emitter-Base Voltage                             | 5          | V                |
| $I_C$     | Collector Current (DC)                           | 5          | A                |
| $I_{CP}$  | Collector Current (Pulse)                        | 8          | A                |
| $I_B$     | Base Current (DC)                                | 120        | mA               |
| $P_C$     | Collector Dissipation ( $T_a=25^\circ\text{C}$ ) | 2          | W                |
|           | Collector Dissipation ( $T_C=25^\circ\text{C}$ ) | 65         | W                |
| $T_J$     | Junction Temperature                             | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature                              | - 65 ~ 150 | $^\circ\text{C}$ |

Equivalent Circuit



#### Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter                                     | Test Condition                                                                   | Min.         | Max. | Units |
|----------------|-----------------------------------------------|----------------------------------------------------------------------------------|--------------|------|-------|
| $V_{CEO(SUS)}$ | Collector-Emitter Sustaining Voltage : TIP120 | $I_C = 100\text{mA}, I_B = 0$                                                    | 60           |      | V     |
|                | : TIP121                                      |                                                                                  | 80           |      | V     |
|                | : TIP122                                      |                                                                                  | 100          |      | V     |
| $I_{CEO}$      | Collector Cut-off Current : TIP120            | $V_{CE} = 30\text{V}, I_B = 0$                                                   |              | 0.5  | mA    |
|                | : TIP121                                      | $V_{CE} = 40\text{V}, I_B = 0$                                                   |              | 0.5  | mA    |
|                | : TIP122                                      | $V_{CE} = 50\text{V}, I_B = 0$                                                   |              | 0.5  | mA    |
| $I_{CBO}$      | Collector Cut-off Current : TIP120            | $V_{CB} = 60\text{V}, I_E = 0$                                                   |              | 0.2  | mA    |
|                | : TIP121                                      | $V_{CB} = 80\text{V}, I_E = 0$                                                   |              | 0.2  | mA    |
|                | : TIP122                                      | $V_{CB} = 100\text{V}, I_E = 0$                                                  |              | 0.2  | mA    |
| $I_{EBO}$      | Emitter Cut-off Current                       | $V_{BE} = 5\text{V}, I_C = 0$                                                    |              | 2    | mA    |
| $h_{FE}$       | * DC Current Gain                             | $V_{CE} = 3\text{V}, I_C = 0.5\text{A}$<br>$V_{CE} = 3\text{V}, I_C = 3\text{A}$ | 1000<br>1000 |      |       |
| $V_{CE(sat)}$  | * Collector-Emitter Saturation Voltage        | $I_C = 3\text{A}, I_B = 12\text{mA}$                                             |              | 2.0  | V     |
|                |                                               | $I_C = 5\text{A}, I_B = 20\text{mA}$                                             |              | 4.0  | V     |
| $V_{BE(on)}$   | * Base-Emitter ON Voltage                     | $V_{CE} = 3\text{V}, I_C = 3\text{A}$                                            |              | 2.5  | V     |
| $C_{ob}$       | Output Capacitance                            | $V_{CB} = 10\text{V}, I_E = 0, f = 0.1\text{MHz}$                                |              | 200  | pF    |

\* Pulse Test :  $PW \leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

## Typical characteristics

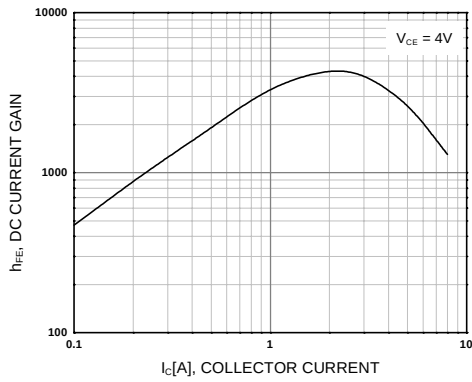


Figure 1. DC current Gain

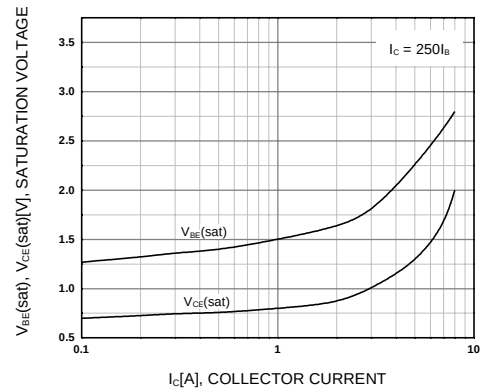


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

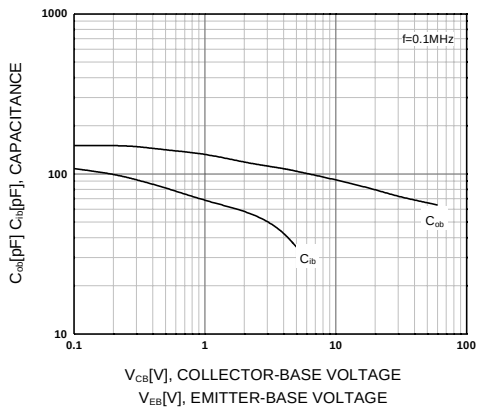


Figure 3. Output and Input Capacitance  
vs. Reverse Voltage

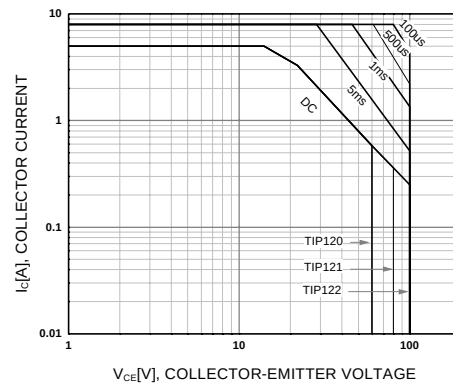


Figure 4. Safe Operating Area

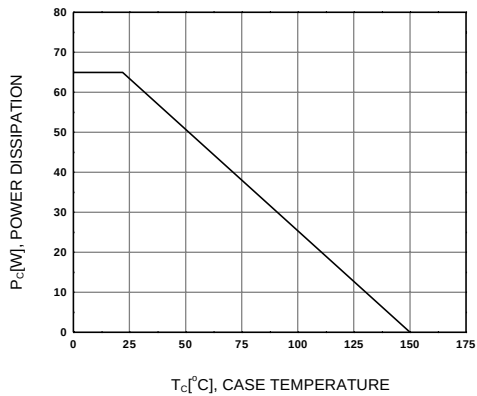
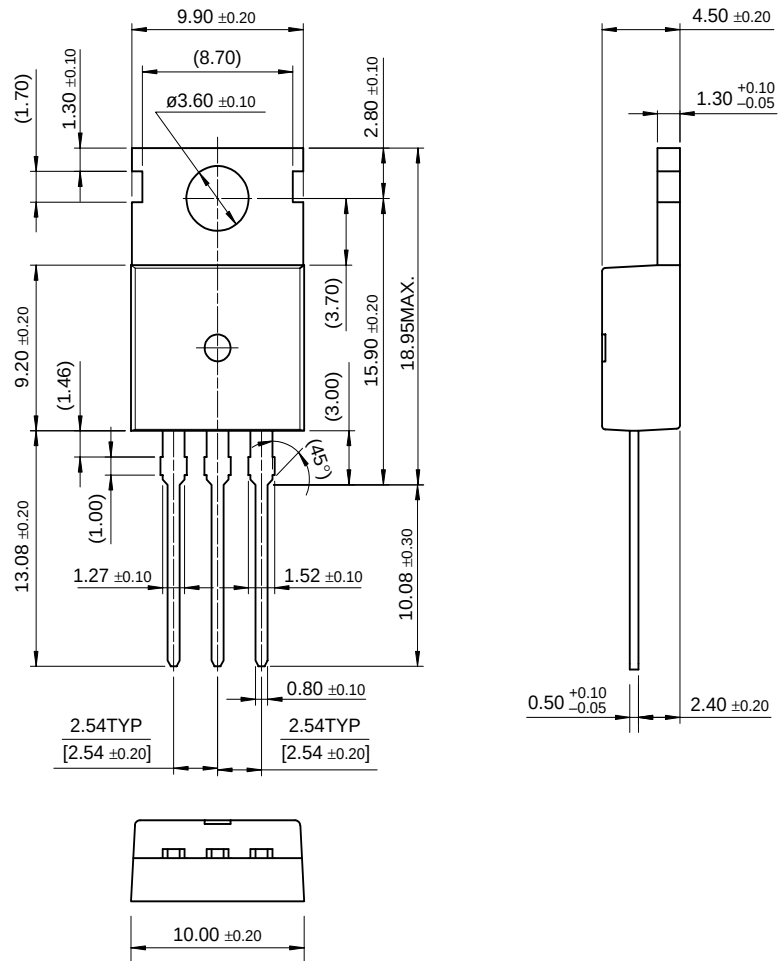


Figure 5. Power Derating

# Package Dimensions

## TO-220



Dimensions in Millimeters

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